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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 31

Application Number: 08/935,844
Filing Date: September 23, 1997
Appellant(s): WILSON ET AL.

Richard F, Giunta
For Appellant

SUPPLEMENTAL EXAMINER'S ANSWER

This is in response to the appeal brief filed May 9, 2002.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

Appellant's brief includes a statement that claims 1-32, 34-60 and 63-63 and 65-67 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) Claims Appealed

Claims 31, 37-38, 56, 62 and 65-66 contain(s) substantial errors as presented in the Appendix to the brief. Accordingly, the claims have been correctly written in the Appendix to the Examiner's Answer.

(9) Prior Art of Record

5544347	Yanai et al.	8-1996
5991813	Zarrow	11-1999
5960216	Vishlitzky et al.	9-1999
5212784	Sparks	5-1993
5537533	Staheli et al	8-1994

Black, U., Computer Networks Protocols, Standards and Interfaces, 2nd Edition, December 1993, pp. 159-161

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 U.S.C. § 103

A. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

B. Claims 1-2, 5, 10-12, 19, 39-40, 46-48, 51-52 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zarrow (USPN: 5,991,813) in view of the admitted prior art Yanai (USPN: 5,544,537).

Regarding claims 1, 10-12, 39, 46-47, 51-52 and 61, Zarrow discloses a computer system comprising a CPU (inherent to a computer; Figure 1, Reference 10); a first storage system that is coupled to the CPU to store information written from the CPU (Figure 1, Reference 16); a second storage system (Figure 1, Reference 18); at least one communication link coupling the second storage system to the CPU, the at least one communication link including a network cloud (WAN) that is shared with at least one other resource so that no portion of the network cloud is dedicated exclusively to transferring information between the CPU and the second storage system (Figure 1, Reference 14; C 2, L 1-3); and a mirror controller responsive to the information being written from the CPU to the first storage system to mirror at least some of the information written from the CPU to the first storage system in the second storage system by transferring the at least some of the information through the network cloud (C 4, L 41-67; C 5, L 1-35). Zarrow does not explicitly disclose the communication link extending between the first and second storage systems such that the second system is coupled to the CPU via the first storage system. However, Yanai does teach this feature (Figure 1, Reference 40; C 4, L 50-56).

Yanai teaches that this feature allows data mirroring from a primary data storage system to a secondary storage system without the intervention of the host which improves the performance of the system (C 2, L 25-33). Yanai also teaches that host (server) intervention seriously degrades the performance of the data transfer link between the host computer and the primary storage device. One of ordinary skill in the art would have also recognized that this feature allows the host to perform other task while the storage controller performs the mirroring operation, thereby improving the performance of the system. Therefore, one of ordinary skill in the art would have been motivated to add the teachings of Yanai to the teachings of Zarrow (remote mirroring over a WAN) for the desirable purpose of improved performance.

Regarding claims 2, 19, 40 and 48, Zarrow teaches a WAN (Internet) (C 2, L 1-3).

Regarding claim 5, Zarrow teaches data mirroring over a WAN. A WAN comprises many resources. The protocol implemented in such a network allows for communication between any of the resources.

Regarding claims 3, 18, 41 and 49, Zarrow teaches the concept of data mirroring over a network (WAN) as cited in claims 1, 39 and 47 above. Zarrow does not explicitly teach an Intranet network. However, mirroring is well known in the art for increased reliability which is a desirable feature in a network. Therefore, it would have been obvious to one of ordinary skill in the art to use the teachings of Zarrow and Yanai in an Intranet network for the desirable purpose of reliability.

C. Claims 4 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zarrow (USPN: 5,991,813) in view of the admitted prior art Yanai (USPN: 5,54,537) as applied to claim 1 and further in view of Black (Computer Networks: Protocols, Standards and Interfaces, 2nd Edition, 1993).

Zarrow and Yanai teach the limitations cited above in claim 1; however, Zarrow nor Yanai explicitly teach a packet switched and cell network communication link. Yet, it is evident that issues such as applications, cost and other factors would dictate the use of one type of communication link versus another. It is really an issue of design choice. Black teaches in Computer Networks: Protocols, Standards and Interfaces, pages 159 -161, that organizations with low to medium traffic volumes could benefit from a packet switch network because most of the carriers charge on the volume of traffic. Thus it would have been obvious to one of ordinary skill in the art to use the teachings of Zarrow and Yanai in a packet switch and cell network for a system with low to medium traffic volumes for the desirable purpose of efficiency and cost.

D. Claims 6-8, 15-16, 20-21, 42-44 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zarrow (USPN: 5,991,813) in view of the admitted prior art Yanai (USPN: 5,544,537) and Vishlitzky (USPN: 5,960,216).

Zarrow and Yanai disclose the limitations cited above for claims 1 and 39. However, Zarrow nor Yanai explicitly disclose a communication link comprising a plurality of communication paths for parallel transfer of packets. Vishlitzky discloses using a plurality of communication paths for parallel transfer of packets (Figure 3a, Reference 21a-21b; C 4, L 62-67; C 6, L 27-47). It also

known in the art to transfer data on parallel paths for increased throughput (such as Packet switch networks). Vishlitzky teaches that this feature enhances reliability by providing more than one path(channel) in case of a failure in one of the channels and this feature increases bandwidth by transferring data on all the channels compared to just a single channel. Thus, it would have been obvious to one of ordinary skill in the art to use a communication link comprising a plurality of communication paths to the system taught by Zarrow and Yanai for increased throughput, reliability and improved system performance.

E. Claims 9 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zarrow (USPN: 5,991,813) in view of the admitted prior art Yanai (USPN: 5,544,537) as applied to claim 1 and further in view of Sparks (USPN: 5,212,784).

Zarrow and Yanai teach the limitations cited above for claim 1, however, neither explicitly teach a communication link including a wireless connection. Sparks does suggest using a wireless connection as a communication link in a backup/mirroring system (C 7, L 28-36). Sparks teaches that such a configuration would allow transmitting backup/mirroring data offsite immediately thus improving the reliability of the system. It is also well known that wireless connections such as satellites provide a large transmission capacity and improve reliability due to the lack of wires. Thus, it would have been obvious to one of ordinary skill in the art to use a wireless connection in the system taught by Zarrow and Yanai for increased reliability and increased throughput.

F. Claim 13 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zarrow (USPN: 5,991,813) in view of the admitted prior art Yanai (USPN: 5,544,537) as applied to claim 1 and further in view of Sparks (USPN: 5,212,784).

Zarrow and Yanai teach the limitations cited above in claims 1 and 39, however, neither explicitly teaches a third storage system having a third communication link wherein information from the primary storage unit is mirrored thereto. However, Sparks suggest using a third storage system and a third communication link for coupling the storage device to the CPU as an additional backup systems, wherein some of the information stored in the CPU would be mirrored/copied thereto (C 7, L 12-36). Sparks teaches that the additional backup system would provide simultaneous backup copies, thus increasing the reliability of the system (C 7, L 17-20). This concept is also known in RAID technology. Therefore, it would have been obvious to one of ordinary skill in the art to add a third storage device and a third communication link for storing mirrored information of the first storage device to the system taught by Zarrow and Yanai for increased reliability.

G. Claims 22-30 and 53-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zarrow (USPN: 5,991,813) in view of Sparks (USPN: 5,212,784) and the admitted prior art Yanai (USPN: 5,544,537).

Regarding claims 22, 24-26 and 53, Zarrow discloses a computer system comprising a CPU (inherent to a computer; Figure 1, Reference 10); a first storage system that is coupled to the CPU to store information written from the CPU (Figure 1, Reference 16); a second storage system (Figure 1, Reference 18); at least one communication link coupling the second storage

system to the CPU (Figure 1, Reference 14; C 2, L 1-3); and a mirror controller responsive to the information being written from the CPU to the first storage system to mirror at least some of the information written from the CPU to the first storage system in the second storage system by transferring the at least some of the information over the at least one communication link (C 4, L 41-67; C 5, L 1-35). Zarrow does not explicitly disclose the at least one communication link comprising at least one wireless connection. However, Sparks does suggest using a wireless connection as a communication link in a backup/mirroring system (C 7, L 28-36). Sparks teaches that such a configuration would allow transmitting backup/mirroring data offsite immediately thus improving the reliability of the system. It is also well known that wireless connections such as satellites provide a large transmission capacity and improve reliability due to the lack of wires. Thus, it would have been obvious to one of ordinary skill in the art to use a wireless connection in Zarrow's system for increased reliability and increased throughput. Zarrow nor Sparks explicitly discloses the communication link extending between the first and second storage systems such that the second system is coupled to the CPU via the first storage system. However, Yanai does teach this feature (Figure 1, Reference 40; C 4, L 50-56). Yanai teaches that this feature allows data mirroring from a primary data storage system to a secondary storage system without the intervention of the host which improves the performance of the system (C 2, L 25-33). Yanai also teaches that host (server) intervention seriously degrades the performance of the data transfer link between the host computer and the primary storage device. One of ordinary skill in the art would have also recognized that this feature allows the host to perform other task while the storage controller performs the mirroring operation, thereby improving the performance of the system. Therefore, one of ordinary skill in the art would have

been motivated to add the teachings of Yanai to the teachings of Zarrow and Sparks for the desirable purpose of improved performance.

Claim 23 is rejected for the same rationale as applied to claim 3 above.

Regarding claims 27-30 and 54-55, it is well known to use satellites and microwave systems for a wireless communication link. It would have been obvious to use either for the desirable purpose of design choice.

H. Claims 31-32 and 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zarrow (USPN: 5,991,813) in view of Sparks (USPN: 5,212,784) and the admitted prior art Yanai (USPN: 5,544,537).

Zarrow discloses a computer system comprising a CPU (inherent to a computer; Figure 1, Reference 10); a first communication link (Figure 1, Reference 32); a first storage system coupled to the CPU via the first communication link to store information written from the CPU (Figure 1, Reference 16); a second storage system (Figure 1, Reference 18); a second communication link coupling the second storage system to the CPU (Figure 1, Reference 14); and a mirror controller responsive to the information being written from the CPU to the first storage system to mirror at least some of the information written from the CPU to the first storage system in the second storage system (C 4, L 41-67; C 5, L 1-35). Zarrow does not explicitly disclose a third storage system and a third communication link coupling the third storage system to the CPU. However, Sparks suggest using a third storage system and a third

communication link for coupling the storage device to the CPU as an additional backup systems, wherein some of the information stored in the CPU would be mirrored/copied thereto (C 7, L 12-36). Sparks teaches that the additional backup system would provide simultaneous backup copies, thus increasing the reliability of the system (C 7, L 17-20). This concept is also known in RAID technology. Therefore, it would have been obvious to one of ordinary skill in the art to add a third storage device and a third communication link for storing mirrored information of the first storage device to Zarrow's system for increased reliability. Zarrow nor Sparks explicitly discloses the communication link extending between the first and second storage systems and the first and third storage system such that the second system and third storage system is coupled to the CPU via the first storage system. However, Yanai does teach the concept of extending the communication link between a primary and secondary (backup) storage systems such that the secondary storage system is coupled to the host via the first storage system (Figure 1, Reference 40; C 4, L 50-56). Yanai teaches that this feature allows data mirroring from a primary data storage system to a secondary storage system without the intervention of the host which improves the performance of the system (C 2, L 25-33). Yanai also teaches that host (server) intervention seriously degrades the performance of the data transfer link between the host computer and the primary storage device. One of ordinary skill in the art would have also recognized that this feature allows the host to perform other task while the storage controller performs the mirroring operation, thereby improving the performance of the system. Therefore, it would have been obvious to one of ordinary skill in the art to add the teachings of Yanai to the teachings of Zarrow and Sparks for the desirable purpose of improved performance.

Regarding claims 35 and 38, multicasting is known in the art. It is an efficient way of transferring data to simultaneously to multiple devices. Thus it would have been obvious to one of ordinary skill in the art to use multicasting in the system taught by Zarrow and Sparks for the desirable purpose of efficiency.

I. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zarrow (USPN: 5,991,813) in view of Sparks (USPN: 5,212,784) as applied to claim 31 above and further in view of Black (Computer Networks: Protocols, Standards and Interfaces, 2nd Edition, 1993). Zarrow and Sparks teach the limitations cited above in claim 34, however, Zarrow and Sparks do not explicitly teach a packet switched and cell network communication link. However, it is evident that issues such as applications, cost and other factors would dictate the use of one type of communication link versus another. It is really an issue of design choice. Black teaches in Computer Networks: Protocols, Standards and Interfaces, pages 159 -161, that organizations with low to medium traffic volumes could benefit from a packet switch network because most of the carriers charge on the volume of traffic. Thus it would have been obvious to one of ordinary skill in the art to use the teachings of Zarrow and Sparks in a packet switch and cell network for a system with low to medium traffic volumes for the desirable purpose of efficiency and cost.

J. Claims 56-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zarrow (USPN: 5,991,813) in view of Staheli (USPN: 5,537,533) and Yanai (USPN: 5,544,537). Zarrow discloses a computer system comprising a CPU (inherent to a computer; Figure 1, Reference 10); a first storage system that is coupled to the CPU to store information written from

the CPU (Figure 1, Reference 16); a second storage system (Figure 1, Reference 18); at least one communication link coupling the second storage system to the CPU (Figure 1, Reference 14; C 2, L 1-3); and a mirror controller responsive to the information being written from the CPU to the first storage system to mirror at least some of the information written from the CPU to the first storage system in the second storage system by transferring the at least some of the information over the at least one communication link (C 4, L 41-67; C 5, L 1-35). Zarrow discloses the at least one communication link consisting of the Internet (Figure 1, Reference 14). Zarrow does not explicitly disclose the communication link consisting of the Intranet, however, Zarrow teaches mirroring data over a WAN for improved reliability. The Intranet is a smaller and secured network system compared to the WAN. However, it is well known in the art, particularly in networks used at a company, for devices (computers, storages, etc) to communicate over an Intranet. One of ordinary skill in the art would have recognized the befits of Zarrow teachings and would have been motivated to use Zarrow's teachings in a system with devices communicating over an Intranet for the desirable purpose of improved reliability. Additionally, Zarrow does not disclose the communication link extending between the first and second storage systems such that the second system is coupled to the CPU via the first storage system. However, Yanai does teach this feature (Figure 1, Reference 40; C 4, L 50-56). Yanai teaches that this feature allows data mirroring from a primary data storage system to a secondary storage system without the intervention of the host which improves the performance of the system (C 2, L 25-33). Yanai also teaches that host (server) intervention seriously degrades the performance of the data transfer link between the host computer and the primary storage device. One of ordinary skill in the art would have also recognized that this feature allows the host to

perform other task while the storage controller performs the mirroring operation, thereby improving the performance of the system. Therefore, one of ordinary skill in the art would have been motivated to add the teachings of Yanai to the teachings of Zarrow for the desirable purpose of improved performance.

K. Claim 59-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zarrow (USPN: 5,991,813) in view of Black (Computer Networks: Protocols, Standards and Interfaces, 2nd Edition, 1993) and the admitted prior art Yanai (USPN: 5,544,537).

Zarrow discloses a computer system comprising a CPU (inherent to a computer; Figure 1, Reference 10); a first storage system that is coupled to the CPU to store information written from the CPU (Figure 1, Reference 16); a second storage system (Figure 1, Reference 18); at least one communication link coupling the second storage system to the CPU (Figure 1, Reference 14; C 2, L 1-3); and a mirror controller responsive to the information being written from the CPU to the first storage system to mirror at least some of the information written from the CPU to the first storage system in the second storage system by transferring the at least some of the information over the at least one communication link (C 4, L 41-67; C 5, L 1-35). Zarrow does not explicitly disclose the at least one communication link being one of a packet switched and cell switch network. However, it is evident that issues such as applications, cost and other factors would dictate the use of one type of communication link versus another. It is really an issue of design choice. Black teaches in Computer Networks: Protocols, Standards and Interfaces, pages 159 -161, that organizations with low to medium traffic volumes could benefit from a packet switch network because most of the carriers charge on the volume of traffic. Thus

it would have been obvious to one of ordinary skill in the art to use the teachings of Zarrow in a packet switch and cell network for a system with low to medium traffic volumes for the desirable purpose of efficiency and cost. Zarrow nor Black explicitly discloses the communication link extending between the first and second storage systems such that the second system is coupled to the CPU via the first storage system. However, Yanai does teach this feature (Figure 1, Reference 40; C 4, L 50-56). Yanai teaches that this feature allows data mirroring from a primary data storage system to a secondary storage system without the intervention of the host which improves the performance of the system (C 2, L 25-33). Yanai also teaches that host (server) intervention seriously degrades the performance of the data transfer link between the host computer and the primary storage device. One of ordinary skill in the art would have also recognized that this feature allows the host to perform other task while the storage controller performs the mirroring operation, thereby improving the performance of the system. Therefore, one of ordinary skill in the art would have been motivated to add the teachings of Yanai to the teachings of Zarrow and Black for the desirable purpose of improved performance.

L. Claims 62-67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zarrow (USPN: 5,991,813) in view of the admitted prior art Yanai (USPN: 5,544,537) and Vishlitzky (USPN: 5,960,216).

Regarding claims 62-67, Zarrow discloses a computer system comprising a CPU (Figure 1, Reference 10); a first storage system that is coupled to the CPU to store information written from the CPU (Figure 1, Reference 16); a second storage system (Figure 1, Reference 18); at least one communication link coupling the second storage system to the CPU, the at least one

communication link including a network cloud (WAN) that is shared with at least one other resource so that no portion of the network cloud is dedicated exclusively to transferring information between the CPU and the second storage system (Figure 1, Reference 14; C 2, L 1-3); and a mirror controller responsive to the information being written from the CPU to the first storage system to mirror at least some of the information written from the CPU to the first storage system in the second storage system by transferring the at least some of the information through the network cloud (C 4, L 41-67; C 5, L 1-35). Zarrow does not explicitly disclose the communication link extending between the first and second storage systems such that the second system is coupled to the CPU via the first storage system. However, Yanai does teach this feature (Figure 1, Reference 40; C 4, L 50-56). Yanai teaches that this feature allows data mirroring from a primary data storage system to a secondary storage system without the intervention of the host which improves the performance of the system (C 2, L 25-33). Yanai also teaches that host (server) intervention seriously degrades the performance of the data transfer link between the host computer and the primary storage device. One of ordinary skill in the art would have also recognized that this feature allows the host to perform other task while the storage controller performs the mirroring operation, thereby improving the performance of the system. Therefore, one of ordinary skill in the art would have been motivated to add the teachings of Yanai to the teachings of Zarrow for the desirable purpose of improved performance. Zarrow nor Yanai explicitly disclose a communication link comprising a plurality of communication paths for parallel transfer of packets. Vishlitzky discloses using a plurality of communication paths for parallel transfer of packets (Figure 3a, Reference 21a-21b; C 4, L 62-67; C 6, L 27-47). It also known in the art to transfer data on parallel paths for increased

throughput (such as Packet switch networks). Vishlitzky teaches that this feature enhances reliability by providing more than one path(channel) in case of a failure in one of the channels and this feature increases bandwidth by transferring data on all the channels compared to just a single channel. Thus, it would have been obvious to one of ordinary skill in the art to use a communication link comprising a plurality of communication paths to the system taught by Zarrow and Yanai for increased throughput, reliability and improved system performance.

(11) Response to Arguments

Overall Issue(s)

In response to the argument presented by the Applicant as to the type of system that one of ordinary skill in the art would have been led to by the teachings of Zarrow and Yanai, which yields a system employing a dedicated high speed point to point communication link between the storage, the Examiner disagrees.

Figure 1 illustrates the system the Applicant believes one of ordinary skill in the art would have been led to from the teachings of Zarrow and Yanai. The Figure shows host to host communication via a network and storage to storage communication via a dedicated link. Zarrow teaches remote mirroring using the host via the network connection and Yanai teaches remote mirroring using the storage controllers via the dedicated link. Thus the illustration shown by the Applicant suggests a system wherein mirroring is performed using the host via the network cloud AND wherein mirroring is performed using the storage controllers via the

dedicated link. The Applicant has tried to bodily incorporate the features of the secondary reference into the structure of the primary reference. This rationale is improper as the the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. **Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.** See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Regarding Applicant's argument that the final office action fails to establish a prima case of obviousness, as it does not even attempt to explain the system that one of ordinary skill in the art would allegedly have arrived at based upon the teachings of the prior art, the Examiner disagrees.

The MPEP states:

> "To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations".
>
> and
>
> "To reach a proper determination under 35 U.S.C. 103, the examiner must step backward in time and into the shoes worn by the hypothetical "person of ordinary skill in the art" when the invention was unknown and just before it was made. In view of all factual information, the examiner must then make a determination whether the claimed invention "as a whole" would have been obvious at that time to that person. Knowledge

of applicant's disclosure must be put aside in reaching this determination, yet kept in mind in order to determine the "differences," conduct the search and evaluate the "subject matter as a whole" of the invention. The tendency to resort to "hindsight" based upon applicant's disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art".

Hence, the establishment of a prima facie case and the method for reaching a proper determination under 35 U.S.C. 103 as indicated by the MPEP does not require explaining/depicting the system, in a diagram or schematic format, that one of ordinary skill in the art would have allegedly arrived at based upon the teachings of the prior art beyond that in which the rejection already indicates. When an obvious rejection is made, the combined teachings provide a legal conclusion as to what one of ordinary skill in the art would have been motivated to arrive at based upon the collective teachings of the prior art. Accordingly, a prima facie case of obviousness as dictated by the MPEP has been met.

It should be noted that in the interview conducted with the Applicant, the Applicant asked the Examiner what the diagram of the system configuration would look like from the combined teachings of Zarrow and Yanai. The Examiner indicated that a diagram of the system is not required for establishing a prima facie case of obviousness as pointed out above. However, although a diagram of the system is not required, the obvious rejection indicates what the primary reference teaches and fails to teach, along with the teachings of the secondary reference.

The rejection specifies a system having the combined teachings of the references. In this case, Zarrow specifically teaches mirroring data remotely through a network cloud (WAN). However, in doing so, Zarrow allows host intervention (mirroring software on host machine controls the mirroring operation) wherein the secondary storage is not coupled to the host (CPU) through a secondary storage system. The feature of mirroring using the host is disclosed by Yanai as degrading the performance of the system by overly burdening the host CPU with the task of writing the data to the secondary storage system and thus dramatically impacts and reduces system performance (C 2, L 17-25). Hence, Yanai suggests coupling a secondary storage system to a primary storage via a communication link, thereby coupling the secondary storage system to a CPU via the primary storage system for the purpose of mirroring data without intervention of the host. Thus, the rejection indicates that the aspect of Zarrow's system being modified is the function of performing remote mirroring without host intervention to improve the performance of the system. Based on Yanai's teachings for mirroring without host intervention, the communication link for mirroring should thus be coupled via the storage controllers and not via the hosts. Figure 2 shows an illustration of the system, one of ordinary skill in the art would have arrived upon based on the teachings of Zarrow and Yanai. Hence, it is not clear why the Applicant 's believe modifying Zarrow to perform mirroring over a WAN without the use of a host requires a dedicated point to point communication link. The communication link used in Zarrow's system is dependent upon the environment in which the system is used, which does not change merely from combining Yanai's teachings with Zarrow's teachings.

Regarding Applicant's argument that the record makes clear that specific teachings of Yanai have been ignored, such that the reference has impermissibly not been considered in its entirety, the Examiner disagrees. The Applicant's have not provided any evidence or support which indicates or suggest that the particular type of communication link used in Yanai's system is required to perform mirroring without host intervention in Yanai's invention. In fact, Yanai teaches that any modifications and substitutions by one of ordinary skill in the art are considered within the scope of the present invention (C 8, L 43-46), in which a high speed communication link is claimed (C 9, L 6-8). Yanai does not state that in order to perform remote mirroring without host intervention, it is absolutely necessary to use a particularly type of communication link. Hence, one of ordinary skill in the art would have known that Yanai's teachings were directed to connecting a secondary storage system storage to a primary storage system to perform data mirroring without host intervention which provides improved performance and one of ordinary skill in the art would have also known of different implementations of communication links as point to point communication links were not the only type of communication links known at the time of the invention as is shown in the teachings of Zarrow. It is clear that the communication link in Yanai's system functions merely to couple two systems wherein the type of communication link used does not alter the fact that the secondary storage system is connected to the CPU via the primary storage system and not directly to the host CPU so that mirroring is performed without intervention from the host CPU.

Regarding Applicant's argument that other factors teach away from the present invention, the Examiner disagrees. The Applicant states that the type of storage devices discloses in Zarrow do

not have a network interface that would enable them to communicate over the network. The Applicant has not shown evidence of such and even if this statement is true, a system comprising the combined teachings of Zarrow and Yanai would inherently require such a feature. Thus the system of Zarrow alone may or may not require such a feature but the system of the combined teachings would. The Applicant also states it was "generally understood in the art " that the communication link for remote mirroring must be a high speed communication link and that a network link that is shared by other resources would simply not provide the same performance as a dedicated high speed link. The Applicant has provided no evidence of such a claim. Unless the specifications are clearly indicated for a high speed communication link which explicitly indicates characteristics that are not recognized in a network link, it is understood that a network communication link is a high speed communication link. Network connections have communication links. Thus, for these reasons, the Examiner does not agree that the prior art teaches away from performing direct mirroring between two storage systems over a network connection.

Regarding the Applicant's argument that the Examiner points to no motivation in the prior art of record to make the further modification to the combined system of Yanai and Zarrow to replace the direct point-to-point communication link that Yanai teaches for communicating between the two storage systems, the Examiner's position states that Yanai's teachings are added to Zarrow's teachings. Yanai teaches coupling a secondary storage system to a primary storage via a communication link, thereby coupling the secondary storage system to a CPU via the primary storage system for the purpose of mirroring data without intervention of the host. Zarrow

specifically teaches mirroring data through a network cloud (WAN). However, in doing so, Zarrow allows host intervention (mirroring software on host machine controls the mirroring operation) wherein the secondary storage is not coupled to the host (CPU) through a primary storage system, which Yanai states degrades the performance of the system by overly burdening the host CPU with the task of writing the data to the secondary storage system and thus dramatically impacts and reduces system performance (C 2, L 17-25), which suggests the desirability of using Yanai's teachings. Thus one of ordinary skill in the art would have recognized the performance benefits of the combined teachings of Zarrow and Yanai and would have been motivated to add the teachings of Zarrow to Yanai for improved performance. The Examiner has used the secondary reference for the specific teaching of coupling a secondary storage system to a host CPU via a primary storage system and not for using a point-to-point communication link. Therefore, motivation to replace the direct point-to-point communication link in Yanai's system is not provided, as this feature was not relied upon. As stated above, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into

account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Applicant's arguments concerning Issue 1 (claims 1-3, 5, 10-12, 18-19, 39-41, 46-49 and 51-52) have been addressed in the Overall issues above and support has been provided for the aptness of the rejection.

Applicant's arguments concerning Issue 2 (claims 4 and 17) have been addressed in the Overall issues above and support has been provided for the aptness of the rejection.

Regarding Issue 3 (claims 6-8, 15-16, 20-21, 42-44 and 50), refer to Overall issues. Additionally, regarding Applicant's argument that the prior art does not teach employing a plurality of paths for coupling to a network could, the Examiner disagrees. The teachings of Zarrow and Yanai disclose a communication link coupled to a network cloud. Vishlitzky teaches the concept of employing a plurality of communication paths for parallel transfer of data (Figure 3a, Reference 21a-21b; C 4, L 62-67; C 6, L 27-47), which improves throughput and thereby improves the performance of the system. These enhancements provide the motivation for the desirability of this feature. Hence, the system comprising the combined teachings of Zarrow, Yanai and Vishlitzky would employ a communication path coupled to a network cloud wherein

the communication path comprises a plurality of communication paths for parallel transfer of data.

Regarding Issue 4 (claims 9 and 14), refer to Overall issues. Additionally, regarding Applicant's argument that performing a backup is not mirroring, the Examiner disagrees. Sparks teaches copying (mirroring) data from one storage to another storage which is the same functionality as mirroring. Mirroring data is performing a backup. The limitations in the claims should cite features to distinguish the type of mirroring Applicant is claiming from the mirroring in the prior art. The features that the Applicant is arguing, with regard to the difference between backup and mirroring, are not commensurate with the claims. The claims are examined given the broadest reasonable interpretation.

Regarding issue 5 (claims 13 and 45), refer to Overall issues and to Issue 4.

Regarding Issue 6 (claims 22-30 and 53-55), refer to Overall Issues and above responses regarding Sparks. Additionally, regarding Applicant's argument that one of ordinary skill in the art would not have been motivated to replace the dedicated point to point communication link of Yanai with a wireless connection, the Examiner's position states that Yanai's teachings are added to the teachings of Zarrow and Sparks. Yanai teaches coupling a secondary storage system to a primary storage via a communication link, thereby coupling the secondary storage

system to a CPU via the primary storage system for the purpose of mirroring data without intervention of the host. The combined teachings of Zarrow and Sparks entails remote mirroring over a WAN using a wireless communication link. However, the system taught by Zarrow and Sparks performs mirroring with host intervention, such that the secondary storage is not coupled to the host (CPU) through a primary storage system, which Yanai states degrades the performance of the system by overly burdening the host CPU with the task of writing the data to the secondary storage system and thus dramatically impacts and reduces system performance (C 2, L 17-25), which suggests the desirability of using Yanai's teachings. Thus one of ordinary skill in the art would have recognized the performance benefits of Yanai's teachings and would have been motivated to add Yanai's teachings to the system taught by Zarrow and Sparks, wherein the system performs remote mirroring over a WAN using a wireless communication link, for improved performance. The Examiner has used the secondary reference for the specific teaching of coupling a secondary storage system to a host CPU via a primary storage system and not for using a point to point communication link. Therefore, motivation to replace the direct point-to-point communication link in Yanai's system is not provided as this feature was not relied upon. The system taught by Zarrow and Sparks is modified to provide remote mirroring without host intervention over a WAN using a wireless communication link.

Regarding Issue 7 (claims 31-32 and 35-38), refer to Overall issues and Issue 4-5.

Regarding Issue 8 (claim 34), refer to Overall issues and Issue 7.

Regarding Issue 9 (claims 56-58), refer to Overall issues and Issue 1.

Regarding Issue 10 (claims 59-60), refer to Overall issues.

Regarding Issue 11 (claims 62-63 and 65-67), refer to Overall issues, Issue 1 and Issue 3.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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September 30, 2002

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Appendix to Examiner's Answer

31. A computer system comprising:

a central processing unit (CPU);

a first communication link;

a first storage system coupled to the CPU via the first communication link to store information written from the CPU;

a second storage system;

a second communication link coupling the second storage system to the CPU, wherein the second communication link extends between the first and second storage systems so that the second storage system is coupled to the CPU via the first storage system;

a third storage system;

a third communication link coupling the third storage system to the CPU, wherein the third communication link extends between the first and third storage systems so that the third storage system is coupled to the CPU via the first storage system; and

a mirroring controller, responsive to the information being written from the CPU to the first storage system, to mirror at least some of the information written from the CPU to the first storage system in both the second and third storage systems.

37. A method of operating a computer system that includes a central processing unit (CPU), a first communication link, a first storage system coupled to the CPU via the first communication link to store information written from the CPU, a second storage system, a second communication link coupling the second storage system to the CPU and extending between the first and second storage systems so that the second storage system is coupled to the CPU via the first storage system, a third storage system, and a third communication link coupling the third storage system to the CPU and extending between the first and third storage systems so that the third storage system is coupled to the CPU via the first storage system, the method comprising a step of:

(A) in response to the information being written from the CPU to the first storage system, mirroring at least some of the information written from the CPU to the

first storage system, the second and third storage systems by transferring the at least some of the information over the second and third communication links.

38. The method of claim 37, wherein step (A) includes steps of:

forming each of the second and third communication links through a network cloud that is shared by the first, second and third storage systems; and

multicasting the at least some of the information stored by the CPU in the first storage device to the second and third storage systems over the network cloud.

56. A computer system comprising:

a central processing unit (CPU);

a first storage system that is coupled to the CPU to store information written from the CPU;

a second storage system;

at least one communication link coupling the second storage system to the CPU so that the CPU can store information in the second storage system, the at least one communication link being selected from the group consisting of an Ethernet link, an asynchronous transfer mode (ATM) link, an FDDI link and a fibre channel link, wherein the at least one communication link extends between the first and second storage systems such that the second storage system is coupled to the CPU via the first storage system; and

a mirroring controller, responsive to the information being written from the CPU to the first storage system, to mirror at least some of the information written from the CPU to the first storage system in the second storage system by transferring the at least some of the information over the at least one communication link.

62. A computer system comprising:

a central processing unit (CPU);

a first storage system that is coupled to the CPU to store information written from the CPU;

a second storage system;

at least one communication link coupling the second storage system to the CPU, the at least one communication link including a network cloud that is shared with at least one other resource so that no portion of the network cloud is dedicated exclusively to transferring information between the CPU and the second storage system, wherein the at least one communication link includes a plurality of communication paths from the CPU to the network cloud, so that a plurality of packets of the information can be transferred from the CPU to the second storage system in parallel through the network cloud; and

a mirroring controller, responsive to the information being written from the CPU to the first storage system, to mirror at least some of the information written from the CPU to the first storage system in the second storage system by transferring the at least some of the information through the network cloud.

65. A method of mirroring information stored in a computer system comprising a central processing unit (CPU), a first storage system that is coupled to the CPU to store information written from the CPU, and a second storage system coupled to the CPU by at least one communication link, the at least one communication link including a network cloud that is shared with at least one other resource so that no portion of the network cloud is dedicated exclusively to coupling the second storage system to the CPU, the method comprising a step of:

(A) in response to information being written from the CPU to the first storage system, transmitting at least some of the information written from the CPU to the first storage system over at least two parallel paths into the network cloud with the second storage system designated as a destination for the at least some of the information, so that the at least some of the information can be transferred through the network cloud and mirrored in the second storage system.

66. A computer system capable of mirroring information in a remotely disposed target storage system that is coupled to the computer system via at least one communication link that includes a network cloud that is shared with at least one other resource, the computer system comprising:

a central processing unit (CPU) coupled to the network cloud;

a source storage system that is coupled to the CPU to store information written from the CPU; and

a controller, responsive to the information being written from the CPU to the source storage system, to transfer at least some of the information written from the CPU into the network cloud so that the at least some of the information can be mirrored in the target storage system, wherein the CPU is coupled to the network cloud through a plurality of communication paths so that a plurality of packets of the information can be transferred from the CPU to the target storage system in parallel through the network cloud.